
THE CHALLENGES OF ARTIFICIAL INTELLIGENCE IN LIBRARY MANAGEMENT SYSTEM

By

**Theresa Nse UDO-OKON, Ph.D.
Department of Educational Technology and Library Science
University of Uyo, Uyo.**

And

**AKPAN, E. Ebenezer. Ph.D. FCICN, AP, PPGDCA, PHDCDPM
Corporate Institute of Research and Computer Science
140 Ikot Ekpene Road Uyo,
Akwa Ibom State**

ABSTRACT

This study examined the challenges of artificial intelligence in library management systems. Library management systems have taken a different dimension from what they were traditionally known for, including the utilization of artificial intelligence. The study expounded on the integration of artificial intelligence (AI) into library management systems, which it mentioned has significantly advanced the digitization and automation of library services. The study similarly also expounded on the numerous challenges facing artificial intelligence in library management systems, which include: ethical challenge, legal challenge, social challenge, technical challenge, financial challenge, poor content digitization process, phobia for job displacement, poor maintenance culture, and poor network connectivity. Furthermore, the study suggested various remedies for each of the challenges. The study concluded that the integration of AI into library management systems marks a significant leap in digitization and automation, promising enhanced user experiences and streamlined operations. However, challenges loom large. Ethical dilemmas, including privacy and bias concerns, demand vigilant solutions to uphold fairness and accountability. One of the recommendations made was for school management to ensure that they provide comprehensive training programmes for staff and students to understand and utilise AI tools effectively.

KEYWORDS: Artificial Intelligence, Library, Management and Library Management System

INTRODUCTION

The integration of artificial intelligence (AI) into library management systems represents a significant advancement in the digitization and automation of library services. As noted by Nmecha and Basse (2020), libraries in the 21st century have taken on different dimensions from what they used to be. With the advent of AI technologies, libraries have the potential to enhance user experiences, optimize resource allocation, and streamline administrative tasks. However, this integration also brings forth various challenges that need to be addressed to fully harness the benefits of AI in library management systems. This study explores the multifaceted challenges posed by the incorporation of AI in library operations, ranging from ethical considerations to technical complexities.

Ethical considerations emerge as a paramount challenge in leveraging AI within library management systems. As AI algorithms make decisions and recommendations based on data inputs, concerns regarding privacy, data security, and algorithmic bias become prominent (Anderson, 2016). Libraries, as custodians of vast amounts of sensitive user data, must navigate these ethical dilemmas to ensure the responsible and equitable deployment of AI technologies (Hart, 2019). Furthermore, libraries must establish transparent policies and mechanisms for accountability to mitigate the risks associated with AI-driven decision-making processes (Nicholson, 2020).

Technical complexities also present significant challenges in implementing AI within library management systems. Integration issues, interoperability with existing systems, and data quality concerns can hinder the seamless adoption of AI-driven solutions (Saracevic & Kantor, 2016). Moreover, the lack of technical expertise and resources may pose barriers to libraries seeking to develop and maintain AI applications (Zhang & Zhu, 2018). Addressing these technical challenges requires collaboration between librarians, information technology specialists, and AI experts to develop robust, scalable, and user-friendly solutions (Townsend & Forrest, 2018).

Another challenge lies in ensuring the accessibility and inclusivity of AI-powered library services. While AI technologies have the potential to personalize user experiences and improve accessibility for patrons with disabilities, they may also exacerbate existing disparities if not implemented thoughtfully (Braun et al., 2019). Libraries must proactively address issues of the digital divide, algorithmic discrimination, and user trust to ensure that AI-driven services cater to the diverse needs of their communities (Wagner et al., 2020). Additionally, efforts to promote digital literacy and awareness are essential to empower patrons to navigate AI-infused library environments (Zhang et al., 2019).

The challenges of integrating artificial intelligence into library management systems are multifaceted and require careful consideration from various perspectives. Ethical concerns regarding privacy, data security, and algorithmic bias must be addressed to uphold principles of fairness and accountability. Technical complexities related to integration, interoperability, and resource constraints necessitate collaborative efforts and innovative solutions. Furthermore, ensuring the accessibility and inclusivity of AI-powered library services is paramount to avoiding exacerbating existing disparities. By addressing these challenges thoughtfully, libraries can harness the transformative potential of AI to enhance their operations and better serve their communities.

CONCEPT OF LIBRARY

A library is an establishment that provides its members and the general public with access to a collection of books along with other materials and media. Libraries frequently offer quiet locations for individual study sessions, common areas to support group work and study sessions, and public areas where patrons can use their electronic resources and the Internet. According to the American Library Association (2022), a library is a collection of resources in a variety of formats that is organized by professionals or other experts who provide convenient physical, digital, bibliographic, or intellectual access and offer targeted services and programmes with the mission of

educating, informing, or entertaining a variety of audiences with the goal of stimulating individual learning and advancing society as a whole.

Furthermore, Bassey and Bantai (2021) defined a library as “a collection of resources in a variety of formats that are organized by information professionals or other experts. Francis (2024) added that “a library is a collection of books used for reading or studying, or the building or room in which collections of information are kept.” Amiri (2024) similarly mentioned that a library is an “organized collection of resources made accessible to a defined community for reference or borrowing.” A library is organized for use and maintained by a public body, an institution, a corporation, or a private individual. Bassey and Umoh (2023) posited that library is a “collection of resources, books, or media that are available for use rather than merely display.” A library is a collection of books, magazines, newspapers, and other materials made available for people to borrow or use for reference (Ashikuzzaman 2024).

Furthermore, libraries are an integral part of society and have been for thousands of years. They give everyone access to knowledge and information, regardless of background or ability to pay, and are vital resources for individuals, communities, and societies. Libraries also play a significant role in promoting literacy, intellectual freedom, and cultural diversity. It acts as a centre for learning, study, and recreation, enabling people to meet new people, explore novel concepts, and broaden their horizons. The Cambridge Dictionary (2024) defined a library as a building, room, or organization that has a collection of books, documents, music, and sometimes other things, such as tools or artwork, for people to borrow, usually without payment. Libraries are indispensable in every facet of education, as they support teaching, learning, and research (Bassey and Igajah, 2017).

CONCEPT OF LIBRARY MANAGEMENT SYSTEM

An automated library system is another name for a library management system. It is described as software designed to oversee the fundamental maintenance tasks of a library. The library management system assists in giving users access to staff phone numbers and details on each book that is available in the library. It also keeps track of books published, given in return, and added to the library (Ogundokun, Afolayan, Adegun, and Afolabi, 2020).

According to School Software (2024), a library management system is software that is designed to manage all the functions of a library. It assists the librarian in keeping up a database of recently published books as well as member-checked books and their due dates. Library records are kept up to date via a library management system. It keeps track of the quantity of books in the library, the number that are checked out, the number that are returned or renewed, the amount of late fines, etc. A library management system's main goal is to save a tonne of time and effort by instantly and accurately providing information about any kind of book.

Software called a library management system is used to oversee a library's operations. The programme facilitates the management of all library operations, including the issuance of books and the upkeep of book records. It also makes it possible to manage book details more efficiently, like the author's name, the edition, and a host

of other crucial information. For both the librarian and the students, this makes it simpler to look for books and locate the appropriate resources.

The executive framework used to cope with and work with the vast volume of information created by libraries is called the Library Management System. Bills, books, and customers who have purchased books via the library management system are also tracked using it. In modern educational and cultural organisations, the library management system is essential to the organising and accessibility of a vast array of information resources. The usefulness and effectiveness of library operations are enhanced by the Library Management System (LMS).

CONCEPT OF ARTIFICIAL INTELLIGENCE

A branch of computer science called artificial intelligence studies how computers learn, comprehend data, recognize characters in images, analyses pictures, and simulate how the eyes work. In addition, artificial intelligence refers to the research and programming of computers to carry out intelligence tasks that require human intervention. Bassey and Owushi (2023) defined artificial intelligence as “the development of computer systems that can perform tasks that typically require human intelligence.”

Artificial intelligence in library management illustrates their ability to accomplish specific tasks in the presence of variability, monitor the library environment, and appropriately adjust their actions based on what they perceive as prerequisites for intelligence (Omame & Nmecha, 2020). Students and library employees can benefit from knowledge-based services offered by artificial intelligence in library administration. Since artificial intelligence is used to organize and make vast, easily accessible information collections available to students, it plays a significant role in the management of school libraries.

Moreover, Zhang (2024) explained artificial intelligence as the application of machine learning and other techniques in research that offers opportunities for libraries to expand their services. In order to provide students at the institution with academic research consulting services, the library relies heavily on artificial intelligence. Furthermore, Okunlaya & Alias (2022) stated artificial intelligence as one of the latest digital transformation technological trends the university library can use to provide library users with alternative educational services. Furthermore, a group of technologies known as artificial intelligence integrate data, algorithms, and processing capacity to enhance library and educational administration. Artificial intelligence has been increasingly shaping library management settings in recent years (Sharma 2023).

As libraries transform into vibrant information hubs, artificial intelligence presents unparalleled opportunity to enhance productivity, personalize services, and safeguard the societal legacy. The use of artificial intelligence in library management raises ethical concerns, such as data privacy, preferences in procedures, and the responsibility of preserving intellectual freedom (Suhās & Narayanrao, 2014). Chabots, which are used to give library patrons immediate help and support and enhance user engagement overall, are powered by artificial intelligence. Artificial intelligence technology integration has the potential to significantly improve library operations and management's accuracy, efficiency, and user experience.

COMPONENTS OF LIBRARY MANAGEMENT SYSTEM

The following are the components of a library management system:

- **User Interface:**

With the help of this component, users can interact with the system more easily and search for books, reserve things, renew loans, and access library resources from a distance. It should be intuitive and user-friendly to enhance the user experience (Wang & Wang, 2019).

- **Cataloguing and Classification:**

Using established systems like the Library of Congress Classification or the Dewey decimal classification, this component entails arranging and classifying library materials. It includes adding metadata, indexing, and assigning unique identifiers to each item (Rathinasabapathy & Jawahar, 2017).

- **Circulation Management:**

The administration of circulation takes care of the lending and returning of library materials. It tracks item availability, manages loan periods, generates overdue notices, and handles fines and fees (Dhillon & Kumar, 2018).

- **Acquisitions and Budget Management:**

This part makes it easier to get new library materials. It includes functions such as vendor management, purchase order processing, budget allocation, and invoice management (Chin & Gracy, 2016).

- **Serials Management:**

Subscriptions to journals, periodicals, and other serial publications are managed by serials management. It includes subscription tracking, managing renewal dates, and handling claims for missing issues (Narayana & Ravi, 2019).

- **Electronic Resource Management (ERM):**

ERM deals with the acquisition, licensing, and access management of electronic resources such as e-books, e-journals, databases, and multimedia content (Singh & Kalra, 2018).

- **Reporting and Analytics:**

Tools for creating reports and assessing data on library usage are provided by this component. It helps librarians make informed decisions regarding collection development, resource allocation, and service improvement (Mahapatra & Dora, 2020).

- **Authentication and Security:**

Security and authentication measures make sure that only approved users are able to access private library data and carry out specific system functions. This component includes user authentication, access controls, and data encryption (Garg & Kaur, 2017).

CHALLENGES OF ARTIFICIAL INTELLIGENCE IN LIBRARY MANAGEMENT SYSTEM

The following are the challenges of artificial intelligence in library management:

- **Ethical challenge:**

It's possible that artificial intelligence has prejudices, mistakes, or covert objectives that compromise the reliability, impartiality, and quality of the data and services offered in school libraries. It is imperative for school librarians to guarantee that the artificial intelligence systems they employ are transparent, accountable, and in harmony with the library's and the students' objectives.

- **Legal challenge:**

Artificial intelligence systems may give rise to legal concerns pertaining to data protection, copyright, privacy, and liability. To respect the rights and interests of the pupils concerned, school librarians must abide by the applicable rules and regulations that control the use and development of artificial intelligence systems.

- **Social challenge:**

Artificial intelligence systems could affect society in ways like widening digital gaps or moulding the tastes and behaviours of pupils. School librarians must guarantee that artificial intelligence systems uphold human dignity, diversity, and inclusion by evaluating the social implications of the technologies they use or develop.

- **Technical challenge:**

Technical constraints of artificial intelligence systems could include complexity, unpredictability, or vulnerability. To make sure that artificial intelligence systems are dependable, strong, and secure, school librarians must be aware of the advantages and disadvantages of the systems that are currently in use or being developed.

- **Financial challenge:**

Financial issues are also included among the main hurdles that can hamper the transformation and development of smart services to obtain all the necessary equipment needed for the implementation of the artificial intelligence system in the library (Henry & Chetachi, 2024).

- **Poor Content Digitization Process:**

The majority of academic libraries continue to struggle with the process of digitizing their local materials, which are primarily in hard copy formats. To influence the use of the artificial intelligence system effectively, school libraries need to digitize their resources, but due to financial limitations and other constraints, the digitization process has been facing a lot of challenges (Ogwo, Ibegbulem, & Nwachukwu, 2023).

- **Phobia for Job Displacement:**

Implementing artificial intelligence system tools in academic libraries may present a challenge due to job displacement. These systems have the ability to automate regular

library functions like inventory management, customer service, and cataloguing, which may result in a reduction in the number of staff members required for the library.

- **Poor Maintenance Culture:**

Because of employment displacement, using artificial intelligence system technologies in university libraries can be difficult. Regular library tasks like cataloguing, customer service, and inventory management can be automated by these systems, potentially lowering the number of employees needed for the library.

- **Poor Network Connectivity:**

The lack of adequate network bandwidth in Nigerian academic libraries is the bane of successfully using artificial intelligence. Low internet connectivity caused by inadequate bandwidth in school libraries makes it challenging to access and download the necessary datasets.

REMEDIES TO ARTIFICIAL INTELLIGENCE RELATED CHALLENGES IN LIBRARY MANAGEMENT SYSTEM

The following are solutions for each of the issues raised with the application of AI in library management systems:

- **Ethical Challenge:**

To address biases and ensure transparency, librarians should demand transparency and accountability from AI vendors. They should also advocate for diverse data sets to train AI systems, implement bias detection algorithms, and regularly audit AI systems for fairness and accuracy.

- **Legal Challenge:**

Librarians need to ensure compliance with privacy laws by implementing robust data protection measures and obtaining consent for data collection and processing. They should also respect copyright laws by obtaining proper licenses for digitized content and enforcing usage restrictions.

- **Social Challenge:**

Librarians should conduct thorough impact assessments to understand how AI systems might affect different student groups. They should actively promote digital literacy to bridge the digital divide and advocate for inclusive design principles to ensure AI systems cater to diverse needs and preferences.

- **Technical Challenge:**

Librarians should invest in ongoing training for staff to understand AI technologies and their limitations. They should also prioritize security measures to protect AI systems from cyber threats and invest in robust infrastructure to ensure reliability and scalability.

- **Financial Challenge:**

Librarians can seek funding opportunities from government grants, private foundations, or collaborative partnerships to support the implementation of AI systems. They should also prioritize budget allocation for AI development and maintenance to ensure long-term sustainability.

- **Poor Content Digitization Process:**

Librarians can explore cost-effective digitization solutions such as crowdsourcing or collaborative partnerships with other institutions. They should prioritize digitization efforts based on user needs and available resources, leveraging student volunteers or interns if possible.

- **Phobia for Job Displacement:**

Librarians should emphasize the role of AI as a tool to enhance rather than replace human librarians. They can focus on retraining and up skilling staff to adapt to new roles and responsibilities in the digital age, such as curating digital collections or providing personalized research assistance.

- **Poor Maintenance Culture:**

Librarians should develop and enforce maintenance protocols for AI systems, including regular updates, backups, and troubleshooting procedures. They should also promote a culture of responsibility and ownership among staff to prioritize the upkeep of AI infrastructure.

- **Poor Network Connectivity:**

Librarians should advocate for improved internet infrastructure and bandwidth allocation from relevant authorities. They can also explore alternative connectivity solutions, such as satellite internet or mobile hotspots, to ensure reliable access to online resources.

CONCLUSION

The integration of AI into library management systems marks a significant leap in digitization and automation, promising enhanced user experiences and streamlined operations. However, challenges loom large. Ethical dilemmas, including privacy and bias concerns, demand vigilant solutions to uphold fairness and accountability. Technical hurdles, such as integration and expertise shortages, call for collaborative innovation. Ensuring inclusivity and accessibility remains pivotal, with AI's potential to bridge gaps but also widen disparities if implemented haphazardly. Thoughtful navigation of these challenges is imperative for libraries to unlock AI's transformative power, enriching operations, and community service.

RECOMMENDATIONS

- School management should ensure that they provide comprehensive training programmes for staff and students to understand and utilize AI tools effectively.

This includes workshops, seminars, and continuous professional development opportunities focused on AI literacy.

- Library management should establish and enforce robust data privacy policies to protect user information. Given that AI systems often require large amounts of data to function effectively, it is crucial to ensure that this data is collected, stored, and processed in compliance with data protection regulations.
- Librarians should embrace a mindset of continuous learning and adaptation to keep pace with evolving AI technologies. This involves staying updated with the latest developments in AI, participating in relevant training sessions, and being proactive in exploring how AI can enhance their daily tasks and improve user services.

REFERENCES

- American Library Association (2022) Definition of a Library: General Definition Available at: <https://libguides.ala.org/library-definition>
- Amiri, H. M. (2024). Define Library. Different Type of library. Discuss the Gradual Development of Different Type of Library in Different Ages. Available at: https://www.academia.edu/2314259/Define_Library_Different_Type_of_library_Discuss_the_gradual_development_of_different_type_of_library_in_deferent_ages
- Ashikuzzaman (2024). What is a Library? Available at: <https://www.lisedunetwork.com/library-definition-and-meaning/>
- Bassey, M. M., & Igajah, M. N. (2017). *Library Education Programmes and Literacy Skills as Predictors of Library use in University Libraries in Akwa Ibom State, Nigeria: Akwa Ibom State Library and Information Services*. Afrischolar Discovery Repository (Annex).
- Bassey, M. M., & Owushi, E. (2023). Adoption of Artificial Intelligence in Library and Information Science in the 21st Century: Assessing the Perceived Impacts and Challenges by Librarians in Akwa Ibom and Rivers States. *International Journal of Current Innovations in Education*, 6(1), 75-85.
- Bassey, M. M., & Umoh, M. S. (2023). Libraries: Transforming the Educational Process through Total Quality Management (TQM) in Akwa Ibom State. *Information Horizons: American Journal of Library and Information Science Innovation* (2993-2777), 1(5), 14-25.
- Bassey, M., & Bantai, R. (2021). Regulation of Library Noise Policy for Effective Noise Control: *Universal Journal of Library and Information Science*. Afrischolar Discovery Repository (Annex).
- Cambridge Dictionary (2024). Meaning of Library in English Available at: <https://dictionary.cambridge.org/dictionary/english/library>
- Chin, M., & Gracy, K. (2016). Library Acquisitions. In M. Drake (Ed.), *Encyclopedia of Library and Information Sciences* (4th ed., pp. 1-12). Taylor & Francis.
- Dhillon, J. K., & Kumar, V. (2018). Library Circulation. In I. Ahmad (Ed.), *Handbook of Research on Managing Intellectual Property in Digital Libraries* (pp. 183-201). IGI Global.
- Francis, F. C., Haider, Salman, Estabrook, Leigh, S. and Foskett D. J. (2024). Library. *Encyclopedia Britannica*. <https://www.britannica.com/topic/library>
- Garg, A., & Kaur, H. (2017). Library security. In A. K. Tyagi (Ed.), *Handbook of Research on Inventive Biomedical Engineering* (pp. 337-350). IGI Global.
- Henry N.O. & Chetachi G.U. (2024). Advantages and Challenges of Implementing Artificial Intelligence in Academic Library Services. *International Journal of Education, Research and Scientific Development*. 5(1):2992-5673

- Mahapatra, S. N., & Dora, M. (2020). Library Analytics. In B. S. Chinara (Ed.), *Handbook of Research on Strategic Performance Management and Measurement Using Data Analytics* (pp. 125-141). IGI Global.
- Narayana, M. S., & Ravi, R. (2019). Serials Management. In B. Raju & M. Nagaraju (Eds.), *Handbook of Research on Leveraging Big Data in Exploring Unknown and Untreated Diseases* (pp. 210-226). IGI Global.
- Nmecha, J. A., & Basse, M. M. (2020). *Library Advocacy: A Strategy for Sustaining Library Services in the 21st Century: Anthology in Library and Information Science: A Festschrift in Honor of Professor Blessing Esuru Ahiauzu*. Afrischolar Discovery Repository (Annex).
- Ogundokun, R. O., Afolayan, J. O., Adegun, A. A., and Afolabi, A. G. (2020). Marketing Information Products and Services through Digital Platforms: Tools and Skills. *Handbook of Research on Digital Devices for Inclusivity and Engagement in Libraries*.
- Ogwo U., Ibegbulem F. & Nwachukwu N.V. (2023). Applications and Perceived Impact of Art of Artificial Intelligence in Academic Libraries in Nigeria available at: <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=15180&context=libphilprac>
- Okunlaya O.R. & Alias A.R. (2022). Artificial Intelligence (AI) Library Services Innovative Conceptual Framework for the Digital Transformation of University Education. Available at: <https://www.emerald.com/insight/content/doi/10.1108/LHT-07-2021-0242/full/html>
- Omame M.I. & Nmecha A. C. (2020). Artificial Intelligence in Libraries Available at: https://www.researchgate.net/publication/338337072_Artificial_Intelligence_in_Libraries#:~:text=Application%20of%20artificial%20intelligence,%2C%20and%20knowledge%2Dbased%20services.
- Rathinasabapathy, S., & Jawahar, S. (2017). Library Cataloging. In S. Rathinasabapathy & S. Jawahar (Eds.), *Handbook of Research on Inventive Digital Tools for Collection Management and Development in Modern Libraries* (pp. 1-19). IGI Global.
- School Software (2024). Library Management System. Available at <https://www.schoolsoftware.com.ng/library-management-system/>
- Sharma S. (2023). The Role of Artificial Intelligence in Shaping Library Management and its Utilization. Available at: <https://ieeexplore.ieee.org/document/10150520>
- Singh, A., & Kalra, P. (2018). Electronic Resource Management. In A. Singh & P. Kalra (Eds.), *Library Collection Development and Acquisition System* (pp. 201-214). IGI Global.
- Suhas D. R. & Narayanrao S.S (2014). The Use of Artificial Intelligence in Library Management. *Journal of Emerging Technology and Innovative Research*. 10(6): page 122-123.

Wang, L., & Wang, X. (2019). Library Management System. In J. Zhou (Ed.), *Encyclopedia of Database Systems* (2nd ed., pp. 1-6). Springer.

Zhang Bouri J.S. (2024). The Role of AI in Library Services. Available at:
<https://www.elsevier.com/connect/the-role-of-ai-in-library-services>